

Effectiveness of ethyl chloride spray in reducing the pain during venipuncture procedure among hospitalized children

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Abstract

Venipuncture is one of the most common painful procedures performed for all the hospitalized children. Hospitalization is a stressful and painful situation for all children due to the painful procedures doing in hospital like Venipuncture. The American Pain Society reveals that 70% of children reported pain during hospitalization, of which 30% reported severe pain and 15% reported extremely severe pain. The aim of this study was to assess Effectiveness of ethyl chloride spray in reducing the pain during Venipuncture procedure among hospitalized children. The Study was conducted among 164 Hospitalized children between the ages of 4 to 12 years of age undergoing Venipuncture procedure at selected Hospitals, Bengaluru. They were selected by using Purposive sampling technique. Socio-demographic data was collected from the mothers or care takers of hospitalized children. Wong-Baker Faces Pain Scale and Numeric Pain Rating scale were used for assessing the pain during Venipuncture procedure among hospitalized children. Ethyl chloride spray was applied topically just before the Venipuncture in experimental group. The data were analyzed by using descriptive and inferential statistics. Majority (67.1 %) of children had no pain during venipuncture procedure in experimental group compared to control group. Ethyl chloride spray is effective in reducing the pain during Venipuncture procedure among hospitalized children between the ages of 4 to 12 years [the calculated value ($t=23.591$, $p<0.001$) is less than $p<0.05$]. The study revealed that ethyl chloride spray is very much effective in reducing the pain during venipuncture procedure among hospitalized children. It can be recommended for children to reduce their pain and anxiety during venipuncture procedure.

Keywords: Effectiveness, Ethyl chloride spray, Pain, Venipuncture procedure, Hospitalized children.

Introduction

Hospitalization is a stressful condition for all, especially for children of all age groups. Pediatric patients are often subjected to

unexpected medical procedures that cause pain & anxiety for the children. Venipuncture is one of the most common painful procedures performed in the hospital.¹

Venipuncture refers to when a vein is pierced by a needle for either intravenous injection or for the collection of blood for diagnostic or therapeutic purposes.²

The children will experience moderate to severe pain during the venipuncture procedure. It has been reported to be the most common painful event for a hospitalized child. It is an emotional distress that leads to impairment in the quality of life.¹

One of the main issues facing public health is pain, which has a profound effect on people and society. Several clinical investigations have shown that not treating pain can have both short-term and long-term negative effects.⁷

Ethyl chloride spray is a vapocoolant medication that causes skin numbness and is applied locally to reduce pain during minor surgical operations and IV catheter placement. When used in conjunction with muscle-stretching procedures, it also aids in the relief of deep muscle discomfort. It suppresses the conduction of nerve impulses from sensory nerves, causing vasoconstriction and lowering the release of local vasodilating agents, therefore decreasing nociceptor sensitivity.⁹

The content of ethyl chloride or chloroethane spray is 100 ml of liquefied gas, which corresponds to 88 gm of ethyl chloride. The spray tin contains ethyl chloride as a clear, colorless liquefied gas with a faintly sweet odor.¹⁰ It is available in aerosol mist spray, fine spray and medium spray formulations. On intact skin, ethyl chloride is usually sprayed for three to ten seconds. A 4 to 10 second spray of ethyl chloride on the skin results in local anesthesia for approximately 30 seconds to one minute. It should be applied from a distance of 8 to 23

centimeters (3 to 9 inches) perpendicular to the skin.⁹

Vapocoolant spray appears to be a more effective anaesthetic, it's inexpensive, accessible and produces skin anaesthesia quickly. Furthermore, many of the studies have demonstrated the effectiveness of vapocoolant sprays in venipuncture procedure. According to a recent study, vapocoolants were beneficial for both adults and children undergoing intravenous cannulation.⁷

Objectives:

The objectives of the study were

1. To assess the pain level of hospitalized children during venepuncture procedure in experimental and control groups.
2. To analyse the effectiveness of ethyl chloride spray in reducing the pain among hospitalized children during venepuncture procedure.
3. To find out the association between post-test pain level scores with selected socio-demographic variables in experimental and control groups.

Hypotheses: -

All hypotheses will be tested at 0.05 level of significance.

H₀₁: There will be no significant difference in the effectiveness of ethylchloride spray between the experimental and control groups on assessing the pain level using the Wong-Baker Faces Pain Scale and the Numeric Pain Rating Scale.

H₀₂: There will be no significant association between the selected socio-demographic variables and post-test pain level scores in the experimental and control groups.

H₁: There will be a significant difference in the effectiveness of ethyl chloride spray between the experimental and control groups on

assessing the pain level using the Wong-Baker Faces Pain Scale and Numeric Pain Rating Scale.

H₂: There will be a significant association between the selected socio-demographic variables and post-test pain level scores in the experimental and control groups.

Materials and methods:

Source of Data: The data was collected from the mothers or care takers and hospitalized children at selected hospitals, Bengaluru, Karnataka.

Research approach: Quantitative approach.

Research design: Quasi-experimental Post-test only design was adopted for the study.

Research setting: The study was conducted at the Selected Hospitals, Bengaluru, Karnataka.

Results and Interpretation

Population: Hospitalized children between the ages of 4 to 12 years under going venipuncture procedure at selected hospitals, Bengaluru, Karnataka.

Sampling technique: Purposive sampling technique was used for the selection of samples.

Sample size: The sample size is 164 who fulfils the inclusion criteria was selected for the study.

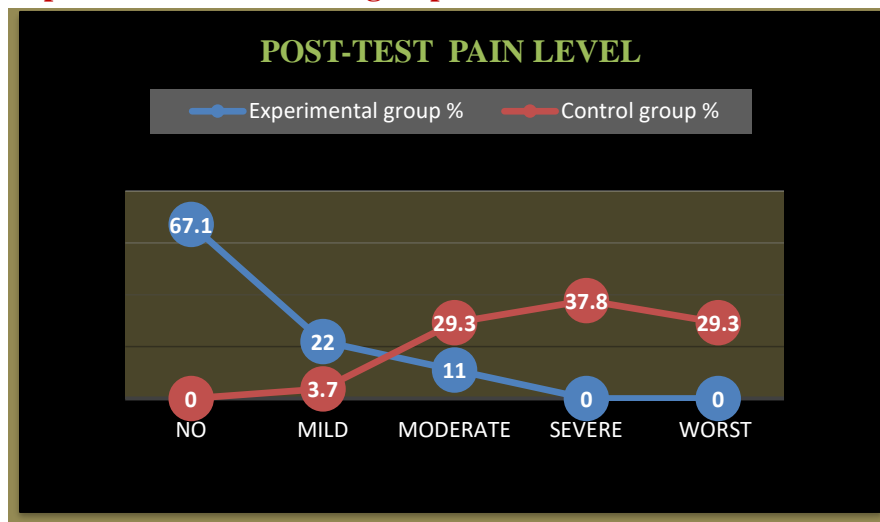
Instrument used:

- Section A: Demographic data.
- Section B: a). Wong-Baker Faces Pain Scale (WFPS)
b). Numeric Pain Rating Scale (NPRS)

Plan for Data Analysis:

The data was analysed by using descriptive and inferential statistics.

Figure 1: Frequency and percentage distribution of subjects according to the post-test pain levels in both experimental and control group.



The above table and line diagram show that in the experimental group, majority 55 subjects (67.1%) had no pain during venipuncture procedure. Where in control group, majority 31 Subjects (37.8%) had severe pain, 24 subjects (29.3%) had worst and moderate pain and only 3 subjects (3.7%) had mild pain during venipuncture procedure.

Table 1: Mean and Standard deviation of post-test pain scores in both experimental and control group
N=164 (82=82)

Sl. No	Group	Min	Max	Mean	SD
1	Experimental group	0	6	.89	1.556
2	Control group	3	10	7.65	2.075

The overall actual scores of the Pain scales (Wong-Baker Faces Pain Scale and Numeric Pain Rating Scale) are in the range of 0 to 10. The above table shows that in experimental group, the minimum score is zero, whereas maximum score is six, with the mean of 0.89 and a standard deviation of 1.556. In control group, the minimum score is 3 whereas maximum score is 10 with the mean of 7.65 and a standard deviation of 2.075 respectively.

Table 2: Effectiveness of Ethyl chloride spray in reducing the pain during venipuncture procedure.
N=164 (82=82)

Sl. No.	Group	Mean	SD	T test	P value
1	Experimental group	.89	1.556	-23.591	< 0.001
2	Control group	7.65	2.075		

The data presented in the table 5 shows that the calculated value ($t = 23.591, p < 0.001$) is less than $p < 0.05$. Hence the null hypothesis (H_{01}) was rejected and inferred that there is a significant difference in the effectiveness of Ethyl chloride spray during venipuncture procedure in the experimental group. Hence the Ethyl chloride spray is effective in reducing the pain during venipuncture procedure among hospitalized children between the ages of 4 to 12 years.

Table 3: Association of post-test pain level scores with selected socio-demographic variables in experimental group
 $n_1=82$

Sl. No	Variable	Pain level			Chi Square	df	Significance
		No pain	Mild	Moderate			
1	Age of the child (in years)				10.268	6	*
	45447	15	3	5			
	45510	10	6	3			
	45573	9	5	0			
	45636	21	4	1			

2	Gender						
	Male	31	11	5	0.138	2	**
	Female	24	7	4			
3	Religion						
	Hindu	45	13	8	3.798	4	**
	Muslim	7	5	1			
	Christian	3	0	0			
4	Diagnosis						
	Fever and associated symptoms	20	4	3	4.754	6	**
	Respiratory related	13	4	1			
	Accidents	6	3	3			
	Other diseases	16	7	2			
5	Past history of hospitalization						
	No	47	14	9	2.373	2	**
	Once	8	4	0			

Note: ** - Not Significant at 0.05 level of Significance. * -Significant at 0.05 level of Significance.

The data in Table 6 shows Chi-square results that, there was a significant association between post-test pain level scores with age of the child.

Chi-square results that, there was no significant association between post-test pain level scores with other demographic variables as gender, religion, diagnosis and past history of hospitalization.

Thus, H₀₂ was rejected and inferred as there was a significant association between post-test pain level score with above mentioned Socio-demographic variable (age) in experimental group.

Table6: Association of post-test pain level scores with selected socio-demographic variables in control group n₂=82

Sl. No	Variable	Pain level				Chi Square	df	Significance
		Mild	Moderate	Severe	Very severe			
1	Age of the child (in years)							
	4-6	0	2	10	14	39.611	9	*
	6-8	0	2	9	8			
	8-10	0	9	2	2			
	10-12	3	11	10	0			

2	Gender							
	Male	2	14	16	13	0.422	3	**
	Female	1	10	15	11			
3	Religion							
	Hindu	2	16	23	19	7.948	6	**
	Muslim	0	7	6	5			
	Christian	1	1	2	0			
4	Diagnosis							
	Fever and associated symptoms	0	6	13	11	9.222	9	**
	Respiratory related	1	5	7	7			
	Accidents	1	2	4	2			
	Other diseases	1	11	7	4			
5	Past history of hospitalization							
	No	3	21	28	21	0.537	3	**
	Once	0	3	3	3			

Note: ** - Not Significant at 0.05 level of Significance. * - Significant at 0.05 level of Significance.

The data in Table 7 shows that, there was a significant association between post-test pain level scores with age of the child.

There was no significant association between post-test pain level scores with other demographic variables as gender, religion, diagnosis and past history of hospitalization.

Thus H₀₂ was rejected and inferred as there was significant association between post-test pain level score with above mentioned Socio-demographic variable (age) in control group. .

Conclusion

As per the study finding, Majority of children had no pain during venipuncture procedure in experimental group compared to control group. The study revealed that ethyl chloride spray is very much effective in reducing the pain during venipuncture procedure among hospitalized children between the ages of 4 to 12 years. It can be recommended for children to reduce their pain and anxiety during venipuncture procedure.

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